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REPORT ON
FEDERAL/PROVINCIAL WORKSHOP ON
GROUNDWATER DATA BANKS

National Hydrology Research Centre
Saskatoon, Saskatchewan

February 6 and 7, 1990

FEDERAL/PROVINCIAL WORKSHOP ON
GROUNDWATER DATA BANKS

Preface

In August 1989, Dr. B. Dousse of Alberta Environment proposed that Inland Waters Directorate (IWD) set up and coordinate a meeting of federal and provincial agencies concerned with groundwater data and data banks. The purpose of the meeting would be to share experiences in this area, discuss the desirability and potential for coordination and cooperation, and a variety of other issues. A similar meeting, which was held in Laval some 15 years ago, was considered very successful.

In response to Dr. Dousse's request, Mr. J. Gilliland, Special Advisor on Groundwater, Water Planning and Management Branch, IWD, organized a Federal/Provincial Workshop on Groundwater Data Banks, which was held in Saskatoon, February 6 and 7, 1990.

AGENDA

Tuesday, February 6, 1990

Time			Moderator
8:30 am	1.	Welcome and Introduction	J.A. Gilliland
8:45 am	2.	Legislative/Regulatory/Organizational Framework a) Purpose(s) of Legislation/Regulations b) Legislative/Regulatory Instruments c) Lessons to be learned from current practice	J.A. Gilliland
10:00 am	3.	Coffee	
10:30 am	4.	Existing Groundwater Databases a) Purposes, e.g., predicting success of drilling new wells, licensing groundwater withdrawals b) Components, e.g., lithological logs, well contruction data, hydrographs c) Type of System, e.g., micro-fiche, card based, computer-based d) Lessons to be Learned from Existing Systems, e.g., personnel/$ requirements, ease of data entry, ease of using software packages	G. Grove
12:00 pm	5.	Lunch	
1:00 pm	6.	Compatibility of Systems Why should systems be compatible? How much compatibility is required? At what level, e.g., input data, stored data, output dat,a? Advantages and drawbacks of developing compatible systems. Costs ($ and PY's)	T. Hennigar

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Time			Moderator
1:30 pm	7.	Kinds of Data Systems Available Today	D. Farley
		a) Data storage systems, e.g., card files, computer-based	
		b) Input systems, e.g., manual, direct input in field	
		c) Output systems, e.g., GIS's, hydro-geologic models	
		d) Costs	
2:30 pm	8.	Coffee	
3:00 pm	9.	Demonstrations and Displays	K. Stewart
		e.g., CD-ROM storage system, existing systems, GIS systems	
4:30 pm	10.	Summary	J.A. Gilliland

Wednesday February 7, 1990

Time			Moderator
8:30 am	1.	Selection of Topics for detailed discussion and selection of panel chairpersons	J.A. Gilliland
9:00 am	2.	Panels/Workshops	To be selected
10:00 am	3.	Coffee	
10:30 am	4.	Panels/Workshops	To be selected
12:00 pm	5.	Lunch	
1:00 pm	6.	Panels/Workshops	To be selected
2:30 pm	7.	Coffee	
3:00 pm	8.	General Discussion	J.A. Gilliland
4:00 pm	9.	Wrap-up and recommendations	J.A. Gilliland

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Workshop Chairman: J.A. Gilliland

Introduction

Representatives of six of the ten provinces and one representative for both the Yukon and Northwest Territories attended the Workshop. (Attendees are listed at the end of this report.) Provinces not represented were Ontario, Quebec, Nova Scotia and Prince Edward Island (the P.E.I. representative was unable to attend due to a last-minute emergency). In addition to the provincial/territorial representatives, various federal people with an interest in groundwater attended, as well as some private sector individuals who demonstrated the newly developed YT/NWT data system.

The Workshop was opened by J.A. Gilliland, and after a short introduction, the Workshop began by addressing Agenda Item 2, the Legislative/Regulatory/ Organizational Framework.

Legislative/Regulatory/Organizational Framework

The aim of this session was to identify and discuss the reasons why agencies want to establish data banks at all. Some of the highlights of this session were:

Roger Hardick said that:

- Alberta is in the process of revising its data systems and its legislation;
- It wants to do an aquifer by aquifer inventory of the province's groundwater resources;

- The major hindrance is the shortage of money and PY resources;
- The protection and development aspects of groundwater management must be considered together.

Marc Zubel stated that:

- B.C. has no groundwater legislation but is reviewing the need for it with a possible target date of 1991;
- Nevertheless, B.C. has a reasonably large groundwater data system maintained both on computer and hard files, which is used extensively to answer requests from drillers, consultants and the general public.

Lock Gray reported that:

- Many different departments and agencies in Manitoba have a statutory or legislative interest in groundwater, which is causing significant problems in coordinating programs;
- Manitoba maintains a computerized data bank for well logs and observation well hydrographs;
- An annual report on wells drilled was published until recently. However, after 15 years of annual reports, the work involved in referring to 15 volumes of data for information on a particular area was overwhelming, and the annual report series was discontinued. Now, selective retrievals can be made using the computerized system.

Lawrence Peters told the Workshop that:

- New Brunswick has a mainframe-based computerized groundwater data system, which is a much modified development of the old GOWN system;
- New Brunswick's biggest problem is person-power to run and maintain the data system;
- Contamination issues are taking up an increasing amount of resource support.

Jim Robinson reported that:

- Newfoundland is now revising its existing legislation to correct deficiencies such as the lack of a permit system, no reference to well-head protection, its restricted application to drilled wells;
- Newfoundland has a micro-based groundwater data system.

Nolan Shaheen reported that in Saskatchevan:

- Saskatchevan Water Corporation (SWC) is concerned strictly with water supply. Water quality issues are the responsibility of Saskatchevan Environment;
- Responsibility for groundwater data is shared between SWC and the Saskatchevan Research Council (SRC);
- With only two people in its groundwater group, SWC is understaffed.

Vlado Schilder of the Department of Indian Affairs and Northern Development (DIAND), Water Resources Division (WRD), reported that for the Yukon and Northwest Territories:

- Although the primary focus of the Northern Inland Waters Act is on surface water, it does cover groundwater as well;
- There is significant potential for groundwater use in the Yukon, but much less in N.W.T. because of geologic conditions and the presence of permafrost;
- WRD is interested in developing guidelines or regulations to be used in groundwater management for the two Territories;
- Groundwater databases have just been developed for the Yukon and N.W.T., which will be the subject of one of the displays later in the day. The databases will be operational next fiscal year. A departmental publication on the databases is in preparation.

Existing Groundwater Databases

After coffee and informal discussions, Gary Grove (NHRI) chaired the next session which dealt with existing groundwater databases. Presentations were made by:

Joe Marciniuk (Alberta, DOE)
Marc Zubel (British Columbia, MOE)
Lock Gray (Manitoba, Department of Natural Resources)
Lawrence Peters (New Brunswick, DOE)
Jim Robinson (Newfoundland, DOE)
Harm Maathuis (Saskatchewan Research Council)
Vlado Schilder (DIAND)
Richard Kellow (PPWB)

Lively discussions took place on the advantages and disadvantages of the various kinds of system used: many organizations use more than one kind of system, e.g., computer-based and microfiche. The most appropriate system for any particular data set depends on the use to which that data set will be put. As various organizations have differing purposes, there is no one "best system" or even a collection of systems which would be "optimum" for all users.

There appeared to be a general consensus that a major problem common to nearly all databases is a shortage of manpower and/or financial resources to prepare data, run the system and use the output efficiently.

Compatibility of Systems

Terry Hennigar chaired the next session on Compatibility of Systems. There appeared to be differing views on the desirability of country-wide compatibility of groundwater data systems, in the sense of everyone using the same data storage formats, codes, etc. or even a common database. Each agency has its own unique requirements, which are the primary determinants of the structure of its data system. The agency which holds the data is, afterall, generally the biggest user of the data. However, it was recognized that there are a significant number of instances where an agency may wish to access and process the data held by one or more other agencies. For example, the Prairie Provinces Water Board (PPWB) Committee on Groundwater (COG) has carried out many groundwater studies along the interprovincial boundaries between Alberta, Saskatchewan and Manitoba. COG's work would benefit significantly if these three provinces could at least provide data in an agreed upon format with a standard system for location, compatible coding systems for lithological logs, etc. Similarly, in the Atlantic region, all four provinces could save time and effort if data could be exchanged in a mutually agreed format. Many agencies of the federal government have an interest in developing national overviews or reviews; their tasks would be made much easier if all data-holding agencies could provide data in the same, nationally agreed upon format.

There was general agreement that these two requirements, namely, independence and freedom to adopt the "best" system for the data collecting and holding agencies together with the need for some minimal standardization for data

exchange with other agencies, are quite compatible and would present no serious difficulties to put in place. However, mechanisms for doing this were not discussed in any detail.

Data Systems Available Today

The next session, chaired by Don Farley, reviewed the various kinds of data systems available today. There are three main system types in use in groundwater data systems today, namely:

1. Magnetic tape with automated retrieval (in use by Manitoba and Environment Canada).
2. Microfiche (in use by Alberta and Environment Canada).
3. On-line storage systems
   a) mainframe-based (e.g. Saskatchevan's system)
   b) microcomputer-based (e.g. Newfoundland, DIAND, B.C.)

A fourth system - CD-ROM - shows significant promise, but so far only the federal government is investigating this new technology.

There was general agreement that some kind of document reference system like WATDOC is very useful, if not essential.

A recent development, CA-NET, is a data-communication system which will facilitate both inter and intraprovincial data transfers and is reasonably inexpensive. Side-benefits include the facilitation of real time or near-real time processing and an enhanced ability to access supercomputers.

A general consensus existed that the data-entry process of nearly all systems needs to be upgraded. Present practices are far too slow.

Demonstration and Displays

The final session of Day 1 was organized and coordinated by Ken Stewart, who put on the following displays:

1. A Groundwater Database on a Personal Computer, presented by Paul Hardisty of Piteau Engineering Ltd., Calgary. This database was recently developed by Piteau Engineering and Integrated Environments Ltd., Calgary, for DIAND to be used in the Yukon and Northwest Territories.

2. A Geographical Information System (GIS) Application on a 386 Personal Computer, presented by Joseph Wells of Integrated Environments Ltd. This application demonstrated the use of the SPANS GIS for pesticide residue mapping.
3. Groundwater Modelling Experiences in the Pacific and Yukon Region (PYR), presented by Hugh Liebscher, Inland Waters Directorate, Pacific and Yukon Region. This presentation highlighted the micro-based computer models used in PYR.
4. Hydrometric Data Retrieval from a CD-ROM Compact Disk, presented by Larry Heinze, Inland Waters Directorate, Western and Northern Region. This demonstration showed how the CD-ROM can store and rapidly retrieve and display information from very large data sets.
5. Capturing Field Data with a Hand-Held Microcomputer, presented by Ken Stewart, Inland Waters Directorate, HQ. This display demontrated a ruggedized, PC-compatible hand-held field data entry unit.
6. Bibliographic Groundwater References of the AQUAREF Database of WATDOC, demonstrated by Debbie McKnight, NHRI, Saskatoon, with commentary from Ken Stewart. This demonstration showed the operation of the AQUAREF data base at CISTI. (This display took place on the morning of February 7.)

Summary and Selection of Topics for Detailed Discussion

The sessions on the Summary and the Selection of Topics were combined and took place on the morning of February 7.

Four main topics were selected for detailed discussion, namely:

1. Management, including both the management of the groundwater resource and the management of the associated databases; the need for the establishment of standards and guidelines for various practices; licensing of drillers (as opposed to licensing of groundwater withdravals, which falls under the management of the resource); and well abandonment - which is one of the practices for which standards/guidelines are needed; database definition and development, and associated software.
2. Coordination, both provincially and nationally.
3. Political and Public Awareness of both the importance of groundwater itself and also the need for and use of groundwater databases.
4. Resources/Database Development (dollars and people).

Workshop Session - Management

Moderator: Roger Hardick, Alberta Environment.

It was agreed that activities such as licensing drillers, regulating well abandonment, developing standards and guidelines and so on are all part of the overall function of groundwater management. The establishment and running of databases are no different from the other activities in that they have to be regarded in terms of their contribution to groundwater management.

It was also agreed that "groundwater management" must include not just the development and allocation of supplies but also the protection of the resource from damage, however caused.

It was further agreed that groundwater/surface water interactions are of critical importance to both groundwater development and protection, and must be considered as an integral part of any overall water management strategy.

The goal of groundwater management should be to assure future sustainability of uses of groundwater.

Groundwater data banks must be considered among the essential tools required to carry out groundwater management as described above. Groundwater data banks store and retrieve various hydrogeologic data and other related data to carry out various tasks in managing groundwater effectively.

Workshop Session - Coordination

Moderator: Lawrence Peters, New Brunswick, DOE.

This session overlapped, to some extent, the previous session on "Management" and the succeeding one on "Political/Public Awareness." The basic concept proposed at this session was that every sector of society has to be involved and informed if our fundamental environmental and groundwater resource management objectives are to be achieved.

This means that effective interactions must occur (and where they do not occur, must be developed) between the environmental and resource development departments within federal and provincial governments; between the federal and provincial governments; between governments and the public; between technical experts and political and public service decision-makers; etc.

Some possible mechanisms discussed included establishing federal/provincial agreements, public awareness programs, information exchange and dissemination.

The basic purpose behind all of these coordination activities is to ensure that society's collective efforts and resources are deployed in the right direction.

In terms of groundwater data banks, one of the most immediate requirements for a coordinated approach is a much better definition of aquifers and the state of groundwater in all jurisdictions for both water supply and protection purposes.

Workshop Session - Political and Public Awareness

Moderator: Marc Zubel, British Columbia Ministry of Environment.

The consensus underlying this session was that both the public and political and public service decision makers are seriously uninformed about the importance of groundwater as a resource and as a critical component of many environmental issues.

One problem identified was that groundwater is very much the "invisible resource" so that we are up against the "out of sight, out of mind" mindset.

The mechanisms discussed for remedying this situation included:

- Newsletters targeted to a variety of audiences
- Information guides, fact sheets, brochures
- Displays for various audiences
- Public "events" - such as Environment Week
- Publishing articles in newspapers
- Media interviews
- Movies/videotapes for various audiences
- Lectures and seminars at colleges and schools
- Advertising government services in, for example, the Yellow Pages.

Most of these relate to audiences outside the public sector. The problem of how to get the "message" to the politicians and public service managers proves to be much more difficult. There appeared to be no immediately obvious answers other than the usual admonition to "sell our programs" to our public service and political masters.

Workshop Session - Resources/Database Development

Moderator: J.A. Gilliland

In this session, federal and provincial representatives discussed resources allocated to their particular organizations for groundwater related work. Funding and personnel levels vary widely across the country and do not seem to correlate particularly well with parameters such as population served or severity of problems faced.

It was recognized that the resources allocated to the agencies represented at the Workshop gave only an incomplete and inaccurate picture because many other agencies with active groundwater related programs were not represented at the Workshop, especially agencies concerned with environmental protection. (Such agencies apparently do not have groundwater data banks.) For this reason, resource allocations to the various agencies are not given in this report.

Nevertheless, there was unanimous agreement that the effectiveness of all groundwater programs, including groundwater data banks, is being severely constrained by resources shortages and that there is little prospect of the situation improving in the foreseeable future. Inter-agency cooperation and collaboration presents an opportunity to alleviate this resource shortage, at least to some extent.

Groundwater data programs and their cost effectiveness must be related to overall benefits from enhanced groundwater management. These would include savings resulting from fewer remedial actions, and reduced capital investments for replacement water supplies if the groundwater becomes contaminated or its sustainability is not maintained for some other reason.

Discussion, Wrap-up and Recommendations

Moderator: J.A. Gilliland

In this final session, there was general agreement on the following points:

1. The major problems facing all agencies lie in the area of groundwater management in its broadest sense.
2. Groundwater databases should address current and future needs in groundwater management.

3. Cost-sharing and cooperative programs in aquifer definition and database development would be a good way to enhance efficiencies in groundwater management programs.
4. Significant potential benefits exist for the development of groundwater data banks with a certain level of technological compatibility (e.g. the area of transboundary waters and their management).
5. Workshops such as this one are very useful and should be held much more frequently.

The major recommendations were:

1. The federal government should take the lead in establishing a focus on groundwater issues across the country.
2. The possibility of establishing cost-sharing and other cooperative arrangements between various government agencies concerned with groundwater should be further explored.
3. The next Workshop should be held in six months and should focus on two issues:
    1. Aquifer Definition
    2. Development of Groundwater Databases.

Don Farley and John Gilliland agreed to develop a proposal to identify groundwater database needs, concepts and standards, and to set out what role the federal government would be prepared to play for discussion at the next Workshop.

The Workshop ended about 4:00 p.m., February 7, 1990.

LIST OF ATTENDEES

Name	Organization
J.A. Gilliland	DOE/IWD/Ottawa
Don Farley	DOW/IWD/Ottava
Ken Stewart	DOE/IWD/Ottawa
Alan Stanley	DOE/IWD/NHRI/Saskatchewan
Gary Grove	DOE/IWD/NHRI/Saskatchewan
Duane McNaughton	DOE/IWD/NHRI/Saskatchewan
Ronald Hofer	DOE/WPM/Regina
Hugh Liebscher	DOE/WPM/Vancouver
Chris Pharo	DOE/WPM/Vancouver
Nolan Shaheen	Saskatchewan Water Corporation
Harm Maathuis	Saskatchewan Research Council
Lock Gray	Manitoba Natural Resources
Richard Kellow	Prairie Provinces Water Board
Lawrence Peters	New Brunswick Dept. of Environment
Jim W. Robinson	Newfoundland Dept. of Environment
Joseph Wells	Integrated Environments Limited
Tad Dabrowski	Piteau Engineering Limited
Paul Hardisty	Piteau Engineering Limited
Vlado Schilder	DIAND, Ottawa
Terry Hennigar	Environment Canada/Halifax
Joe Marciniuk	Alberta Environment/Edmonton
Roger Hardick	Alberta Environment/Edmonton
Larry Heinze	WRB/Environment Canada
Jean Guy Zakrevsky	WQB/Environment Canada
Marc Zubel	B.C. Ministry of Environment/Victoria